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(54) **OVER MOLDED GASKET**

UMGOSSENE DICHTUNG

JOINT D'ETANCHEITE SURMOULE

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(73) Proprietor: **ERICSSON INC.**
Research Triangle Park, N.C. 27709 (US)

(72) Inventor: **GAMMON, John, W.**
Raleigh, NC 27604 (US)

(74) Representative: **HOFFMANN - EITLE**
Patent- und Rechtsanwälte Arabellastrasse 4
81925 München (DE)

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EP 0 940 068 B1

Description

BACKGROUND OF THE INVENTION

Technical Field of the Invention

[0001] The present invention relates to RF shielding applications, and more particularly, to RF shield cans having over molded gaskets.

Description of Related Art

[0002] In electronic application such as cellular telephones, RFI/EMI shielding is necessary to protect and shield sensitive components from interference generated by other components and external sources. Important design considerations of RF shielding involve minimizing the required board area for the RF shield. This involves consideration of the RF shield footprint, placement accuracy of the RF shield and allowance for component clearances.

[0003] Previous methods of connecting RF Shields have included directly soldering the metal shield can to a printed circuit board. While soldering provides an excellent ground contact between the shield and the printed circuit board, this method produces a permanently attached shield can that cannot be readily removed if post-solder assembly or testing is required of the protected circuits. Another method of RF shielding involves the use of electrically conductive adhesive as a bond between the shield and the printed circuit board. However, this approach requires a larger footprint on the printed circuit board to allow an adequate surface area for the adhesive bond.

[0004] A final method of shield can connection utilizes a dispensed gasket applied to the edge of the RF shield (see e.g. EP-A-0 643 551). A dispensed gasket requires a considerably wider width than the can sidewall to allow for adequate bond surface and to compensate for variation in the position of the sidewall location. Current dispensing technology requires the gasket bead to overlap both sides of a thin sidewall to stabilize and harden properly. The gasket width must be further enlarged to accommodate sidewall positioning tolerances and dispensing process tolerances. This occupies a larger area on the printed circuit board, reducing the amount of available space for components.

SUMMARY OF THE INVENTION

[0005] The present invention overcomes the foregoing and other problems with an improved RF shielding apparatus. The apparatus consists of an RF shield can having a top surface and sidewalls extending from the peripheral edge of the top surface. The sidewalls define a number of guide tabs enabling the shield can to be aligned with a gasket molding apparatus into which the sidewalls of the shield can are inserted. Once the sidewalls of the shield can have been inserted into a molding apparatus a gasket molding procedure directly molds an electrically conductive gasket to the sidewalls of the shield can. The gasket-has a fixed geometry (width and shape) that is not dependent on variations in positioning of the sidewall of the RF shield can.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] A more complete understanding of the method and apparatus of the present invention may be obtained by reference to the following Detailed Description when taken in conjunction with the accompanying Drawings wherein:

FIGURE 1 is an in view of a prior art embodiment of a dispensed gasket;
FIGURE 2 is an exploded perspective view of an RF shield can with a gasket molding apparatus;
FIGURE 3a-3b illustrate end views of a gasket and sidewall; and
FIGURE 4 is a perspective view of a shield can with a molded gasket thereon.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0007] Referring now to the drawings, and more particularly to FIGURE 1, wherein there is illustrated a prior art embodiment of a dispensed gasket 5 along the edge of a shield can sidewall 10. The dispensed gasket process, required the gasket 5 overlap both sides of the sidewall 10 to bond properly. The width of the gasket 5 must also insure that the overlap accounts for variations in the sidewall 10 position.

[0008] Referring now to FIGURE 2 there is illustrated an RF shield can 15 and gasket molding apparatus 20. The RF shield can 15 includes a top surface 25 and sidewalls 30 extending downwardly therefrom. The downwardly extending sidewalls 30 define a number of alignment tabs 35 for properly aligning the shield can 15 with the gasket molding apparatus 20. While FIGURE 2 has been illustrated showing the use of alignment tabs 35, it should be realized that the tabs are not necessary, and the shield can 15 may be aligned within the gasket molding apparatus 20 utilizing manual means, vision systems or any other means for properly aligning the shield can 15.

[0009] The shield can 15 is placed within the gasket molding apparatus 20 such that a gasket may be over molded along the edges of the sidewall 30. The molding process utilized may include a liquid injection molding, silicone rubber injection over molding or other suitable process. The over-molded gasket material will comprise any electrically conductive material sufficient for maintaining a low conductive resistanc interfac between the RF shield and the printed circuit board. By over molding the gasket directly to the sidewalls 30 of the

shield can 15 using molding apparatus 20, the width of the gasket 40 is fixed at a substantially constant distance as shown generally in FIGURES 3a through 3c. Since the sidewalls 30 of the shield can 15 are aligned within the mold of the gasket molding apparatus 20, variances in the sidewall position are automatically accounted for within the gasket. As can be seen in FIGURES 3a through 3c, no matter where the sidewall 30 may be positioned, the sidewall will always rest within the width 45 of the molded gasket 40 because the gasket is molded directly to the edge of the sidewall within the gasket molding apparatus 20. This allows the width of the gasket 40 to be substantially reduced from those of prior art embodiments and reduce the printed circuit board area required for the shield can 15 and gasket 40.

[0010] FIGURE 4 illustrates the shield can 15 with the over-molded gasket 40. As can be seen, the gasket 40 has a much higher placement accuracy in smaller geometry area than the dispensed gasket for the prior art illustrated in FIGURE 1. Reduction of the gasket outline width reduces the area required for placement of the shield can 15 on the printed circuit board 50 and reduces the tolerances that must be maintained for adjacent components or RF shields.

[0011] Although a preferred embodiment of the method and apparatus of the present invention has been illustrated in the accompanying Drawings and described in the foregoing Detailed Description, it is understood that the invention is not limited to the embodiment disclosed, but is capable of numerous rearrangements, modifications, and substitutions without departing from the scope of the invention as set forth and defined by the following claims.

Claims

1. An apparatus for shielding components from electromagnetic interference, comprising:

   a shield can having a peripheral edge thereon; and
   a gasket directly molded to the peripheral edge of the shield can, wherein the gasket has a predefined geometry independent of variations in position of the peripheral edge of the shield can.

2. The apparatus of Claim 1 wherein the peripheral edge includes means for aligning the shield can with a gasket mold.

3. The apparatus of Claim 1 wherein the means for aligning includes a plurality of tabs integrally formed with the edge.

4. The apparatus of Claim 1 wherein the gasket is composed of an electrically conductive material.

5. A method for producing an RF shield, comprising the steps of:

   positioning a shield can such that an edge of the shield can rests within a gasket molding apparatus; and
   molding a conductive gasket directly to the edge of the shield can.

6. The method of Claim 5 wherein the step of molding comprises the step of injection molding.

7. The method of Claim 5 wherein the step of positioning further includes the step of inserting guide means on the peripheral edge of the shield can into corresponding guide means on the gasket molding apparatus.

8. An RF shield, comprising:

   a shield can for protecting circuitry from RF energies, the shield can having a sidewall including means for aligning the shield can with a gasket molding apparatus;
   a gasket directly molded to a peripheral edge of the shield can using an injection molding process.

9. The apparatus of Claim 8 wherein the means for aligning includes a plurality of tabs integrally formed with the edge.

10. The apparatus of Claim 8 wherein the gasket is composed of an electrically conductive material.

Patentansprüche

1. Vorrichtung zum Abschirmen von Komponenten bzw. Bauteilen gegenüber elektromagnetischer Interferenz, welche Vorrichtung folgendes aufweist:

   eine Abschirmungskapsel mit einem peripheren Rand daran; und
   eine Dichtung, die direkt mit dem peripheren Rand der Abschirmungskapsel vergossen ist, wobei die Dichtung unabhängig von Variationen in bezug auf eine Position des peripheren Rands der Abschirmungskapsel eine vordefinierte Geometrie hat.

2. Vorrichtung nach Anspruch 1, wobei der periphere Rand eine Einrichtung zum Ausrichten der Abschirmungskapsel mit einer Dichtungsgußform enthält.

3. Vorrichtung nach Anspruch 1, wobei die Einrichtung zum Ausrichten eine Vielzahl von Streifen enthält, die mit dem Rand integral ausgebildet sind.

4. Vorrichtung nach Anspruch 1, wobei die Dichtung aus einem elektrisch leitenden Material besteht.

5. Verfahren zum Erzeugen einer RF-Abschirmung, welches Verfahren die folgenden Schritte aufweist:

   Positionieren einer Abschirmungskapsel so, daß ein Rand der Abschirmungskapsel innerhalb einer Dichtungsformvorrichtung ruht; und Formen bzw. Vergießen einer leitenden Dichtung direkt mit dem Rand der Abschirmungskapsel.

6. Verfahren nach Anspruch 5, wobei der Schritt zum Gießen den Schritt eines Injektionsgießens aufweist.

7. Verfahren nach Anspruch 5, wobei der Schritt zum Positionieren weiterhin den Schritt zum Einfügen einer Führungseinrichtung am peripheren Rand der Abschirmungskapsel in eine entsprechende Führungseinrichtung an der Dichtungsformvorrichtung enthält.

8. RF-Abschirmung, die folgendes aufweist:

   eine Abschirmungskapsel zum Schützen einer Schaltung vor RF-Energien, wobei die Abschirmungskapsel eine Seitenwand mit einer Einrichtung zum Ausrichten der Abschirmungskapsel mit einer Dichtungsformvorrichtung hat; eine Dichtung, die mit einem peripheren Rand der Abschirmungskapsel unter Verwendung eines Injektionsgießprozesses direkt vergossen ist.

9. Vorrichtung nach Anspruch 8, wobei die Einrichtung zum Ausrichten eine Vielzahl von Streifen enthält, die mit dem Rand integral ausgebildet sind.

10. Vorrichtung nach Anspruch 8, wobei die Dichtung aus einem elektrisch leitenden Material besteht.

Revendications

1. Appareil pour protéger des composants contre des parasites électromagnétiques, comportant :

   une boîte de blindage portant un bord périphérique ; et
   un joint d'étanchéité moulé directement sur le bord périphérique de la boîte de blindage, dans lequel le joint d'étanchéité a une géométrie prédéfinie indépendant de variations de la position du bord périphérique de la boîte de blindage.

2. Appareil selon la revendication 1, dans l quel le bord périphérique comprend un moyen pour aligner la boîte de blindage avec un moule du joint d'étanchéité.

3. Appareil selon la revendication 1, dans lequel le moyen d'alignement comprend une pluralité de languettes formées d'une seule pièce avec le bord.

4. Appareil selon la revendication 1, dans lequel le joint d'étanchéité est composé d'une matière électriquement conductrice.

5. Procédé pour la production d'un blindage RF, comprenant les étapes dans lesquelles :

   on positionne une boîte de blindage de manière qu'un bord de la boîte de blindage repose dans un appareil de moulage d'un joint d'étanchéité ; et
   on moule un joint d'étanchéité conducteur directement sur le bord de la boîte de blindage.

6. Procédé selon la revendication 5, dans lequel l'étape de moulage comprend l'étape de moulage par injection.

7. Procédé selon la revendication 5, dans lequel l'étape de positionnement comprend en outre l'étape d'introduction d'un moyen de guidage situé sur le bord périphérique de la boîte de blindage dans un moyen de guidage correspondant situé sur l'appareil de moulage du joint d'étanchéité.

8. Blindage RF, comportant :

   une boîte de blindage destinée à protéger des circuits contre des énergies RF, la boîte de blindage ayant une paroi latérale comprenant un moyen destiné à aligner la boîte de blindage avec un appareil de moulage d'un joint d'étanchéité ;
   un joint d'étanchéité moulé directement sur un bord périphérique de la boîte de blindage en utilisant un processus de moulage par injection.

9. Appareil selon la revendication 8, dans lequel le moyen d'alignement comprend une pluralité de languettes formées d'une seule pièce avec le bord.

10. Appareil selon la revendication 8, dans lequel le joint d'étanchéité est composé d'une matière électriquement conductrice.

FIG. 1

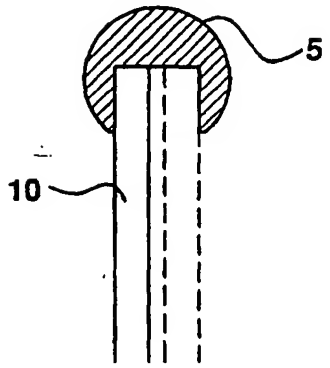

FIG. 2

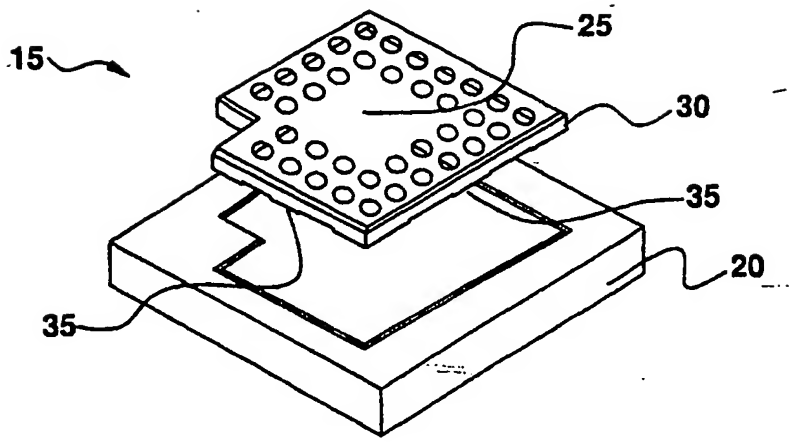

FIG. 3a

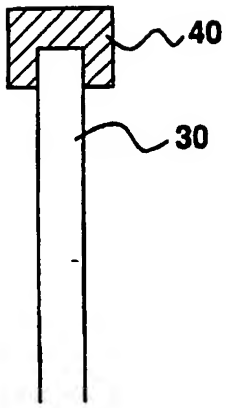

FIG. 3b

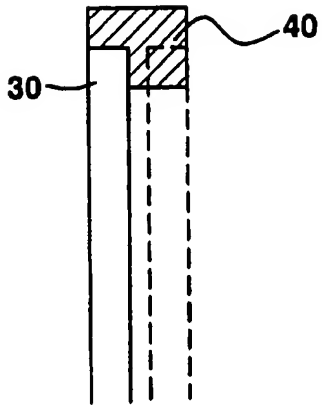

FIG. 3c

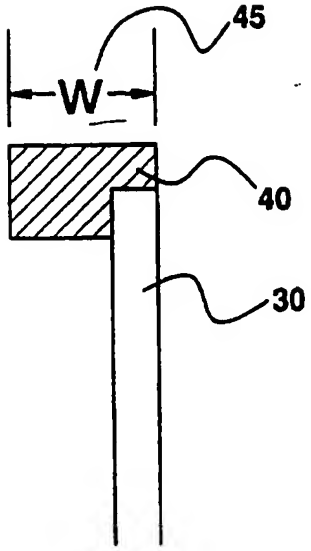

FIG. 4